

WHAT IS CLAIMED IS:

1. A method of manufacturing a synthesis gas containing hydrogen and carbon monoxide, which comprises steps of;

5 removing only hydrogen sulfide from a natural gas containing hydrogen sulfide and carbon dioxide by permitting the natural gas to pass through a hydrogen sulfide-removing device filled with a hydrogen sulfide absorbent;

10 adding carbon dioxide and steam to the natural gas which the hydrogen sulfide has been removed to prepare a mixed gas; and

15 feeding the mixed gas into a reaction tube of a reformer, thereby permitting mainly a steam reforming reaction to take place in the mixed gas.

2. The method of manufacturing a synthesis gas according to claim 1, wherein before the natural gas is fed to the hydrogen sulfide-removing device, the natural gas is forced to pass through a convection  
20 portion communicated with a combustion radiation portion of the reformer, thereby heating said natural gas up to a temperature which is suited for the reaction between the hydrogen sulfide in the natural gas and the hydrogen sulfide adsorbent.

25 3. The method of manufacturing a synthesis gas according to claim 1, wherein the carbon dioxide recovered from a combustion exhaust gas generated at

a combustion radiation portion of the reformer is utilized as a carbon dioxide source.

4. The method of manufacturing a synthesis gas according to claim 1, wherein the carbon dioxide  
5 recovered from the synthesis gas at a downstream side of the reformer is utilized as a carbon dioxide source.

5. The method of manufacturing a synthesis gas according to claim 1, wherein the hydrogen sulfide adsorbent is at least one oxide selected from triiron  
10 tetraoxide ( $\text{Fe}_3\text{O}_4$ ) and zinc oxide ( $\text{ZnO}$ ).

6. The method of manufacturing a synthesis gas according to claim 1, wherein the hydrogen sulfide-removing device is provided with at least one unit of first desulfurizing column filled with the hydrogen  
15 sulfide adsorbent comprising triiron tetraoxide and with a second desulfurizing column filled with the hydrogen sulfide adsorbent comprising zinc oxide, and that the natural gas containing hydrogen sulfide and carbon dioxide is permitted to successively pass  
20 through one column selected from these first desulfurizing columns and second desulfurizing column.

7. The method of manufacturing a synthesis gas according to claim 6, wherein the hydrogen sulfide-removing device is provided with at least three units  
25 of first desulfurizing columns to be filled with triiron tetraoxide, wherein a first placed desulfurizing column among the first desulfurizing

columns is designed to execute an adsorption operation  
of hydrogen sulfide, a second placed desulfurizing  
column among the first desulfurizing columns is  
designed to execute an operation of regenerating the  
5 adsorbent (iron sulfide) on which hydrogen sulfide is  
adsorbed, and a third placed desulfurizing column among  
the first desulfurizing columns is designed to execute  
an operation of reducing the adsorbent that has been  
regenerated, these operations being sequentially  
10 executed.